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ABSTRACT

A case study of on-the-job training was conducted in the stockroom of an electronics manufacturer. The focus was on education embedded in ongoing work activities, in contrast to school-based learning as an activity separate from other life activities. Throughout the study, the interplay of two activities--stockroom work and stockroom training--was analyzed to determine the following: (1) the social aspects of training and working; (2) differences between work during training and experienced work; and (3) the communicative aspects of training. It is noted that, although the company recognizes the need to train new workers and experienced workers are told to train them, training is not included in job descriptions nor do workers get paid extra for it. The study reached the following conclusions: (1) although new workers were expected to take on their responsibilities without being specifically trained for them, even ad hoc on-the-job training is a powerful educative practice at least for initial levels of competency; (2) practical methods and reciprocal teaching characterized on-the-job training; (3) although the company had no specific training curriculum or plan, training methods appeared to be indigenous in workplace communities; and (4) to the extent that training does not facilitate or accelerate the process of becoming adept at troubleshooting or other demanding tasks in an organized way it cannot be fully effective in long-term career development. (NLA)

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ON THE JOB TRAINING: A CASE STUDY

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Introduction

Why study on-the-job training? Although this educational form is widespread, and acknowledged as significant, little is known about the whys and hows of it. Our study in a stockroom was an initial effort to make visible to research and educational communities an actual instance of on-the-job training. We wanted to go beyond general description and make available a detailed analysis of training and learning processes as they occur in the day-to-day working environment: How does the workplace support such learning? What devices do worker-trainers use to help newcomers acquire the knowledge and skills the job requires? How is training fitted into ongoing work activities?

Our effort to unpackage the "black box" of workplace training had broader objectives as well. Educational research has traditionally focused on the schools. Most of what we know about teaching and learning processes derives from studies in academic classrooms. A decade of interdisciplinary research on everyday cognition, however, demonstrates that school-based learning, and learning in practical settings, have significant discontinuities. We can no longer assume that what we discover about learning in schools is sufficient for a theory of human learning. Nor can we make substantial progress toward improving school effectiveness without a better grasp of what makes school a special context for education with its particular strengths and problems. For these reasons, we need to enlarge our understanding of what out-of-school teaching and learning actually entail and how its characteristics compare with school-based learning activities.

Work and Training: One Stream of Behavior, Two Activity Systems

A first step in this enterprise is to break out of the catch-all phrase that lumps all non-school-based learning into one category. Learning may be related to practical activities in a number of different ways that need to be identified and studied. Our case study of on-the-job training concentrates on one such configuration—education embedded in ongoing work activities. The key work here is "embedded." School-based research has fostered a conception of learning as an activity separate from other life activities. But as soon as we enter the workplace, we find that this conception does not hold: the defining feature of on-the-job training is that teaching-and-learning are occurring simultaneously with getting-the-job-done, with working. Training occurs in the course of working. Analytically, two activity systems are in progress but empirically there is only one stream of behavior to observe. Should these behaviors be described as "working" or "training?"

We adopt an analytic stance. We consider stockroom work and stockroom training to represent two different activity systems. Throughout the study, we attempted to capture the interplay of these two activities as they unfolded in the busy work environment.

On-the-Job Training

This case study of on-the-job training—the only one of its kind—was conducted in a stockroom at an electronics manufacturing plant that employs 500 people. The company is a world-class manufacturer of radio frequency connectors, many custom-made for military and civilian uses. Just before our research, the company installed a database computer system, known as Manufacturing Resource Planning or MRP, that was designed to monitor inventory levels and provide a measure of control over production processes. The great variety of items made by the company—20,000 component parts assembled into about 8,000 finished goods—adds up to a significant inventory to manage. The MRP program was designed to keep track of this inventory.

Except for the highest ranks of stockroom material handlers, the company's official job descriptions treat the stockroom positions essentially as that of unskilled labor. Wage rates and hiring practices follow accordingly. A contradiction arises, however, between these practices and the intellectual demands of the work which have increased with the new MRP system.

MRP maintains an electronic record of all transactions made in the stockroom. These transactions are significant to the functioning of the company; based on the data fed into it, the system recommends purchases for future production needs and prepares a production schedule. The effects, therefore, of inaccurate counting, computing, or recording in the stockroom can be severe, with immediate consequences for the production process and with compounded consequences as incorrect data moves through the system.

Stockroom employees are engaged in a variety of tasks requiring literacy and math skills as a part of their routine work. In addition, they need to be continually alert to discrepancies between stockroom records and computer data. They need to "find" problems and, in order to troubleshoot them, they need to understand how the computer thinks as well as how stockroom procedures work.

The company officially recognizes that new hires need training, and training is an explicit category of

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activity within the stockroom. Experienced workers are not simply told to keep an eye on or work alongside of new workers, but are explicitly told to "train" them. Training, however, is not included in workers' job descriptions, and they do not get paid extra for it. In six months of intense observations, the most striking occurrence was that within a brief period of ten weeks, the bulk of the training responsibility passed to brand-new trainees, three of whom had not yet completed their own probationary periods.

Various trainers, in fact, appeared less propelled by considerations of what the new worker needed as by how training could be managed within the ongoing workload of the stockroom. Practical considerations, such as who was around or how pressing the workload was, or how many workers were available, seemed to dictate training choices. For example, during our period of observations, all experienced workers (six, when our study began) either left or were transferred out of the stockroom. As a result, the distance between trainer and trainee narrowed in practice to a point where the placement of individual workers in one category or the other became almost arbitrary. Reciprocal teaching—each one helping the other with what he or she knew best—characterized the stockroom training more aptly than an expert-novice model.

It should come as no surprise that supervisors and senior people have constructed their own assumptions and "theories" of what training should look like. None of these has been incorporated in an explicit training plan. These training assumptions are an unrecorded form of cultural knowledge. Nonetheless, these views about training are firmly grounded in the company's history and practice, and some workers are reflective and explicit about how training "is supposed to be" and bring these views into play when they train. The common core of consensual opinion involves general principles: training revolves around work, is conducted by experienced workers, and should continue for a period of more or less two weeks. Variations involve the exact nature of the work, what should transpire after the core period of training, and how to define good training.

Training begins as soon as the new worker walks into the stockroom. When it ends is not so clear-cut. The probationary period for the job is 60 days, but no one suggested that training covered that entire time. Most supervisors cited "two weeks" as the training period, the cutoff apparently being set at the boundary of a new worker's need to "work with another" or ability to "work alone." Yet two weeks is not set in stone. Even after this period of time, however, a stock handler is not considered fully expert. It may take up to two years, according to one manager, until a stockroom worker is "fine-tuned." Clearly, the period of learning far outstrips the period of training.

Since training proceeds in the absence of any written description, how it is carried out depends crucially on the background and views of the individuals who act as trainers. Supervisors do not engage in training stockroom workers, and no one in the stockroom carries even an auxiliary title of "trainer." It is apparent also that the two supervisors with authority to make decisions about training approach the task from different vantage points: one taking the point of view of what management needs in an end product; the other taking the point of view of the learner's requirements.

The company has no special training materials, and no employee alluded to a need for such materials. The company has no manuals describing principles of inventory or stockroom procedures, nor are instruction sheets available to new workers on topics such as how to use the computer. New workers are not given a tour of the plant.

Although the stockroom has four departments—shipping, receiving, dispatch, and component—training is conducted within the department to which a new worker is assigned. Some senior people in the stockroom believe that this practice should be abandoned in favor of cross-training in the four departments. One supervisor intimated that a higher management decision was needed to implement this change. It is unclear with whom this responsibility rested, but the fact that the supervisor did not put it into effect suggests that, appearances notwithstanding, some general "structure of training" is operative in the plant as a whole and kept in place by "higher authority."

On-the-job training, in this company's stockroom, is an activity subsidiary to work and a dynamic construction into which many factors enter. These factors include supervisors' views of how to train and how much leeway to allow trainers; which level of management is charged with decision-making and in position to implement its "theory" of training; the composition, turnover rate, and workload of the workforce; and background factors such as union policies and established personnel practices. What does *not* happen, however, is that a training "plan" is put into operation. Training "takes shape" as supervisors make decisions on the basis of historical practice, personal theories, and pragmatic constraints.

At this company, neither supervisors' theories of training, nor the training that actually takes shape reflect top management's views of the importance of intellectual understanding of modern forms of inventory control. Training, with one seemingly accidental exception, is assimilated into ongoing work practices, with the consequence that trainees are primarily exposed to routine, "normal" work events and not explicitly prepared for

problem-solving in the context of the data management system.

Social Aspects of Training and Working

Trainer-trainee units, which we called "training dyads" (pairs), are not isolated from wider stockroom activities but interact continually with others in the workplace. The wider community of workers does not go out of its way to lend a hand in training. Workers who approach the training dyad talk to the trainer rather than the learner. Production takes priority over training. Whenever a problem arises, the trainer walks away from the learner and becomes involved in discussions with others about it, resuming his primary function as worker. Trainees are exposed to the nonroutine, problematic aspects of the work through such episodes. Clearly, the social relations of work are not reorganized to accommodate training. Instead, training is embedded in the preexisting system.

Although the learner is often a silent party in these interactions with others in the stockroom, he or she usually observes them. Since these interactions concern work, the learner is exposed to pedagogically rich material. These troubleshooting sessions and discussions of glitches and problems bring the learners into contact with the more intellectually challenging aspects of stockroom work as well as with its collaborative modes of problem-solving.

The complexity of the industrial setting requires workers to operate within a number of domains of knowledge and practice. While the explicit training addresses some of these domains, the larger social world through which information flows furnishes an unplanned yet crucial way for workers to learn to be workers and to master the nonroutine aspects of their jobs.

Differences Between Work During Training and Experienced Work

One of our major findings is that the anatomy of work during training is strikingly different from experienced work. For experienced workers in this stockroom, the whole *activity* of receiving (weighing, counting, locating, and putting parts into stock) is the principle that organizes the work. In training, on the other hand, each *part* functions as the object around which the work is organized, and actions are taken sequentially.

Why did all trainers hit upon the same basic method of training in spite of their differences in personal history and stockroom experience? These trainers were not trained to train, and supervisory personnel never commented on the fact that the work is reorganized for training. One possible explanation is that organizing the work around a whole event sequence—handling a part from start to finish—displays for the learner the functional utility, the meaning of each component action.

It may be that the form of reorganization found here is found in other occupations or workplaces where the actual content of production is different. Whether this is the case or not, our hunch is that reorganization of work for training purposes follows certain orderly forms. To the extent that work constitutes the greater part of the curriculum of on-the-job training, knowledge about these forms and their consequences is important for improving the effectiveness of learning in both workplaces and schools.

Communicative Aspects of Training

Stockroom work has a heavy linguistic component. Trainers are talking as well as working, and so are learners. In contrast to studies of the classroom, research on language in terms of its cognitive as well as social functions is still in its infancy. Because research on the educative role of language in the workplace is just beginning, theoretical foundations are weak. Accordingly, we concentrate our analysis on generating questions about how language functions in on-the-job training.

In the first hours of on-the-job training, trainers talk less in conversational exchanges than they do in stretches of monologue. When exchanges occur, trainers usually initiate them; learners seldom ask the trainers questions or make assertions. Trainers do not use the classic "teacher" model of testing trainees to find out what they know by asking questions and evaluating the answers. Instead, their talk is sprinkled with interjections such as "OK?" and "Right?", and these give learners the opportunity to feed back their understanding. These exchanges seem also to serve the purpose of maintaining contact between the two. Conversations during this initial training period are initiated by the trainer primarily to carry out training goals rather than to accomplish the work.

By far the greatest amount of talk in the training process is provided by the trainer, outside of conversational exchanges. The principal characteristic of this kind of trainer talk, as distinguished from classroom teacher talk, is that it is going on in the context of the activity that it concerns. In presenting a math lesson, a teacher is expounding math but is not at the same time practicing it. In the stockroom, however, the trainer is involving the learner in carrying out work tasks. To the extent that trainer talk explains the work and imparts knowledge about it, exposition and practice, teaching and doing, occur in the same setting among the same participants.

It is an oversimplification to think of "learning by doing" as in some way opposed to "learning by listening and talking." Trainers incorporate talk into the training process and take seriously the responsibility for

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explaining the work as they do it. Since trainers do not segregate talk about the stockroom from the activity of actually engaging in the work, it may not be useful to think of verbal exposition and practical experience as substitutes for one another. Although it is common in anthropological studies to pose "observation" or "experience" against "talk," as the primary way of learning in nonschool settings, it is unclear how one would disentangle these in stockroom training. Our findings point to the need for a closer look at the mechanisms of teaching and learning in the workplace in all their complex relationships.

Conclusions

On-the-job training is of theoretical significance because it represents a form of education that stands in sharp contrast to schooling. Learning in school is divorced from practice. On-the-job training programs offer an array of formats for relating learning to practice that may very well be useful in settings other than the workplace. In probing teaching and learning when they are embedded in work, we are challenged to broaden our conceptions of the kind of social processes and activities that constitute education.

We have arrived at certain characterizations of stockroom training that raise general questions about on-the-job training and hint at possible improvements.

1. Although top management emphasized the higher skills required by the new computer system, they did not modify the company's training practices. Workers were expected to take on the new responsibilities without being specifically trained for them. Yet the training that "took shape" enables new workers to stay on the job and assume increased responsibilities. Stockroom training pragmatically measures up to some level of effectiveness. It is important to note that this level of effectiveness is achieved:
   (a) without the imposition of an educational criterion for hiring;
   (b) with trainers who varied in experience from 13 years to less than two months;
   (c) without any special procedures for introducing learners to the computer system or for acquainting them with general material-control principles.

These circumstances suggest that even ad hoc on-the-job training is a powerful educative practice for *initial* levels of competency.

2. Although trainers are not trained to train, all do in fact train, not merely work alongside newcomers. When we looked closely at what was going on between trainers and learners, we found that all worked out some form of division of labor that drew the trainee into practice in a way that got the work accomplished; and that the trainers reorganized the work in similar ways for training purposes. The systematic approach, in the absence of any specific training curriculum, suggests that ways of guiding others into knowledge and work procedures are indigenous in workplace communities. Workplace settings may contain educational resources with considerable potential.

3. Activities that are called training primarily involve normal work routines. Learners are introduced to the more demanding aspects of the work accidentally, that is, only when a problem arises in the course of routine work. Over a long period of time, new employees "accidentally" encounter a fuller range of problems. But becoming adept at troubleshooting calls for a fuller understanding of the production and computer systems than does the routine work. To the extent that training does not accelerate or facilitate such learning in an organized way it cannot be considered fully effective from the perspective of the worker's long-term career development, even though it may meet management's immediate needs.

We brought to this research the theoretical perspective of activity theory. This perspective helped us analyze the complex and changing relationships of a stream of behavior designed both to educate and to produce manufactured goods. Positing work and training as two different activities enabled us to identify a variety of relationships between them: normal work tasks were incorporated into training, some aspects of work were modified for training purposes, and work not directly related to training nevertheless served training purposes.

This Brief is a distillation of a longer paper by Sylvia Scribner and Patricia Sachs: *A Study of On-the-Job Training*, Technical Paper No. 13. The original paper is available for $7.50 from the National Center on Education and the Economy, Teachers College, Box 174, Columbia University, New York, New York 10027.

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